Space Weather Forecast

Issued on Saturday 1 February 2025 at 12:34 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1 Minor Storms likely Days 1-2 (01-02 Feb) from fast winds and potential Coronal Mass Ejection glance. Further Moderate class flares expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate solar activity over the last 24 hours, with two M-class flares, reaching a peak at 31/1406 UTC. There are eight active regions on the Earth-facing disc. The majority of the activity is from a cluster of three sunspots in the northeast. These form a complex area of multiple small spots, with ongoing slow development. The recent flare activity appears to originate from between two of them, where there are signs of potential instability. This suggests the ongoing potential for notable flares from these regions. There are a number of small and simpler regions across the rest of the disc, however any growth of these remains limited.

A Coronal Mass Ejection (CME) was observed leaving the Sun due to the M6.7 flare from the northeast disc. This has been assessed as missing Earth behind and to the north.

Solar Wind / Geomagnetic Activity: Solar winds showed the onset of a fast wind connection. Wind speeds were initially background around 350 km/s, rising slowly to strong levels around 600km/s. Interplanetary Magnetic Field has been moderate to strong, with the north-south component strongly variable. Geomagnetic activity was initially Quiet (Kp 2), becoming Unsettled to Active (Kp 3-4) later in the period.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate solar activity is expected, with a slight chance of isolated Strong flares, primarily from the regions on the northeast disc.

Solar Wind / Geomagnetic Activity: There is one CME in the forecast, which left the Sun around 30/1400 UTC and could give a glance on Day 2 (02 Feb). There is uncertainty in the possible geomagnetic response to this - it is most likely to be a glancing blow with little significant effect, but with potential for something stronger. Earth is currently connecting to a coronal hole fast wind, and speeds may become strong around 600 km/s. Peak winds are likely to occur around the arrival of any CME glance, before wind speeds gradually ease during Days 3 and 4 (03-04 Feb).

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Unsettled to Active geomagnetic activity is expected, with a likelihood of G1/Minor storms on Day 1 (01 Feb), and a slight chance of G2/Moderate Storms. This continues on Day 2 due to both the potential CME and the ongoing fast winds, but with a slight chance of G3/Strong storms should the CME be stronger than currently anticipated. Activity then easing during Days 3-4, to be Quiet to Unsettled with isolated Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is likely to remain at background levels. However, there is a slightly increasing risk of a rise through this period, as the complex of sunspots in the northeast disc move towards the western hemisphere, which is better connected for energetic particles to reach Earth.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	60	50	20	5
Strong	G3	No	1	10	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	75	75	75	75
Very Active	R3-R5 (X Class)	No	15	15	15	15

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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